

**CLAIMS:**

1. A syringe having a longitudinal axis, a forward end with a needle, and a rearward end, said syringe including:
  - a barrel providing a cylindrical bore;
  - 5 a needle mounting to which said needle is fixed so as to extend forwardly therefrom;
    - a piston rod assembly slidably received in said bore and in sealing contact therewith so as to co-operate with said bore to provide a variable volume chamber to receive a liquid to be injected, said assembly including:
      - 10 a hollow rod extending rearwardly from within said barrel to enable a user to move said assembly to various said volume, said rod having a cavity extending rearwardly from a forward opening in said rod;
      - a gripper device mounted at said forward opening;
    - said syringe further including:
      - 15 a gripper retainer extending between the device and rod to maintain said device fixed to said rod and movable to release said device so that said device moves into said cavity upon said gripper retainer moving forward at said fore end; and wherein said mounting closes said chamber with said needle communicating therewith so that upon a reduction in volume of said chamber said liquid is forced through said needle,
      - 20 said mounting including:
        - a body engaged by said gripper device when adjacent said forward end and before said retainer releases said device, said body when engaged by said device is fixed thereto;
        - means to urge said body and device into said cavity; and wherein
    - 25 said mounting includes a mounting retainer securing said mounting to said barrel but operable to release said mounting so that said mounting moves together with said needle, with said device into said cavity, said mounting retainer being radially moved inward from a retaining position to a release position by forward movement of said piston rod; and
    - 30 an actuation member moved longitudinally forward by the forward movement of said piston rod to thereby actuate said mounting retainer to move radially inward to release said mounting after engagement of said mounting with said device.

2. The syringe of claim 1, wherein the means to urge includes said gripper device closing said opening so that said cavity can maintain a reduced internal pressure relative to atmosphere, so that upon said device engaging said body and said device and mounting being released, said device mounting and needle are moved into said cavity.

5 3. The syringe of claim 1, wherein said means to urge includes a spring engaging said mounting and urging said mounting and device into said cavity.

4. The syringe of claim 1, 2 or 3, wherein the gripper retainer engages a portion of said barrel at said forward end to release said device.

10 5. The syringe of any one of claims 1 to 4, wherein said gripper retainer has an engaging portion that upon complete of the injection stroke attaches the rod to the barrel to prevent rearward movement of the rod.

15 6. The syringe of any one of claims 1 to 5, wherein the mounting includes a rearwardly extending projection, and said gripper device includes a cavity to receive said projection with said projection and gripper device engaging to captively locate said projection in said cavity.

7. The syringe of claim 6, wherein said gripper device includes a neck extending to said cavity, with said projection passing through said neck, with said projection including an expansion member that contracts as projection passes through said neck and expands to captively locate the projection in said cavity.

20 8. The syringe of any one of claims 1 to 7, wherein said mounting includes a forward portion to sealingly connect the mounting to the barrel.

9. The syringe of claim 8, wherein said syringe includes a cap at the forward end of said barrel, which cap receives said mounting and said forward portion.

25 10. The syringe of claim 9, wherein said cap includes at least one passage to allow air to enter the cap so that air pressure is applied to the mounting to urge the mounting into the rod cavity.

11. The syringe of any one of claims 1 to 10, wherein said actuator member is a sleeve surrounding said mounting.

30 12. The syringe of claim 11, wherein said mounting retainer includes a plurality of fingers that are resiliently urged outwardly, and are engaged by a ramp surface of said actuator member to be moved radially inwardly to release the mounting.

13. The syringe of claim 12, wherein said cap includes a forwardly facing abutment surface engaged by said fingers.

14. The syringe of claim 13 when appended to claims 3 and 8, wherein said spring is located in said cap and engages said cap and mounting so as to be compressed therebetween to urge said mounting and device into said cavity.

15. A syringe having a longitudinal axis, a forward end to which a needle is  
5 to be attached, and a rearward end, said syringe including:

a barrel providing a cylindrical bore;

a needle mounting to which said needle is to be attached so as to extend forwardly therefrom, said mounting being at said forward end and providing for the delivery of a liquid to be injected to the needle;

10 a piston rod assembly slidably received in said bore and in sealing contact therewith so as to co-operate with said bore to provide a variable volume chamber to receive the liquid to be injected, the chamber being located between said rod assembly and said forward end, said piston rod assembly including:

15 a piston rod extending rearwardly from within said barrel to enable a user to move said assembly to vary said volume, said rod having a cavity extending rearwardly from a forward opening in said piston rod;

a gripper device mounted at said forward opening and having a stem projecting towards said forward end,

20 a resilient member located in said rod and attached to said rod and device and urging the device into said cavity,

a gripper retainer extending between the device and rod to maintain said device fixed to said rod and operable to release said device so that said device moves into said cavity upon said gripper retainer moving forward at said forward end; and wherein

25 said mounting closes said chamber so that upon a reduction in the volume of said chamber said liquid is forced through said needle, said mounting including:

a body engaged by said gripper device when adjacent said forward end and before said retainer releases said device, said body when engaged by said device being fixed thereto, said body having a passage into which said stem is to project to fix the body to the gripper device;

30 a mounting retainer securing said mounting to said barrel but operable to release said mounting so that said mounting moves, together with the needle when attached thereto, with said device into said cavity, said mounting retainer being moved inwardly

relative to said axis from a retaining position to a release position by forward movement of said piston rod; and wherein

said syringe further includes:

an actuation member moved longitudinally forward by the forward movement of  
5 said piston rod to thereby actuate said mounting retainer to move inwardly to release said mounting after engagement of said mounting with said device.

16. The syringe of claim 15, wherein said resilient means is a spring urging said device into said cavity.

17. The syringe of claim 16, wherein said spring is compressed to urge the  
10 device into said cavity.

18. The syringe of claim 16, wherein said spring is tensioned towards the device into said cavity.

19. The syringe of claim 18, wherein said spring extends between a rearward portion of said device and a rearward portion of said plunger.

15 20. The syringe of claim 17, wherein said spring extends between a rearward portion of said device and a forward portion of said rod.

21. The syringe of claim 15 or 19, wherein said actuation member is part of said rod assembly.

22. The syringe of claim 21, wherein said actuation member is fixed to said  
20 rod.

23. The syringe of any one of claims 15 to 22, wherein said mounting includes a forward portion sealingly connecting the mounting to the barrel.

24. The syringe of any one of claims 15 to 23, wherein said actuation member is a sleeve surrounding said stem.

25. The syringe of any one of claims 15 to 24, wherein said mounting retainer includes a plurality of fingers that are resiliently urged outwardly relative to said axis, and are moved inwardly relative to said axis to release said mounting.

26. The syringe of any one of claims 15 to 25, wherein said mounting includes a catch to engage said stem when said stem projects into said mounting.

30 27. The syringe of claim 26, wherein said stem has an enlarged forward extremity that is engaged by said catch.

28. The syringe of any one of claims 15 to 27, wherein said gripper retainer is moved inwardly with respect to said axis to release said device.

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29. The syringe of any one of claims 15 to 28, wherein said gripper retainer engages said barrel to be moved inwardly with respect to said axis.

30. The syringe of claim 24 or 29, wherein said gripper retainer is a circlip that is resiliently deformed by said barrel to be moved inwardly with respect to said axis.

5 31. The syringe of any one of claims 15 to 30, wherein said gripper device projects inwardly of said rod and is slidably guided thereby for movement between a forward position to engage said mounting, and a retracted position located within said rod together with said mounting.